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Man Can Be Called 'Machine' —But a Most Complex One

DOES MODERN science dehumanize man?

It is easy to find deeply ambivalent feelings about science among intellectuals (even including some scientists), in Congress, among alienated youths and among bewildered citizens. We live in a scientific age whose glories and terrors are both credited to science. At this level, we can hardly deny that our ever-growing scientific mastery over the forces of nature imposes an almost unbearable responsibility on political authority and on a democratic electorate to learn about, think about, plan for and use these forces for real human benefit.

In this climate, many people have become highly sensitized to more ethereal questions that are raised by the scientific study of man. One such question is the doctrine of mechanism. Dr. D. E. Wooldridge, a well-known physicist and systems engineer and a successful industrialist—formerly president of TRW (Thompson-Ramo-Wooldridge) Inc.—has written several excellent syntheses of present day thought in biology. His latest work, "Mechanical Man—the Physical Basis of Intelligent Life," concludes "that a single body of natural laws operating on a single set of material particles completely accounts for the origin and properties of living organisms. Accordingly, man is essentially no more than a complex machine."

A FEW ECCENTRICS aside, the whole community of contemporary science shares the view that the

same laws of nature apply to nonliving and living matter alike. All of us who investigate the chemistry and physics of living organisms pursue our work as if organisms were complex machines, and we find man to exhibit no tissues or functions that would except him from this way of analyzing human nature.

Nevertheless, we are or should be careful to state just what we mean before we assert that "man is a machine," and much more so before using the phrase "merely a machine." The statement that man is "a mere machine," or a mere anything, is a needless irritant to precise communication between scientists and laymen. (We might better proclaim that "man is merely the most complex product of organic evolution on earth, the only organism whose intelligence has evolved to the point that his culture far transcends his biological endowment.")

The "mere machine" phrase is usually a retort to the claim that there are mysteries of human nature that are, in principle, beyond the reach of scientific investigation.

Scientists would do better to save their breath quarreling about what they can analyze in principle; in their own work, they are mercilessly pragmatic about confining their conclusions to what they can examine in practice.

THERE ARE, in fact, theoretical limits to scientific analysis that may justify men in repudiating Dr. Wooldridge's assertion that

"the concept of the machine-like nature of man is incompatible with a long-cherished belief in human uniqueness." There is nothing "mere" about a machine as complex as a man; the word "machine" is just a manner of speaking about the scientist's faith in a universe ordered by natural law. That faith was expressed most eloquently by the French philosopher the Marquis de Laplace, who averred that, given complete knowledge of the universe at one instant, the scientist could in principle compute all of its future states in infinite detail.

In practice, we must now remind ourselves, the scientist and his computers are machines that occupy space and consume energy. Dr. Rolf Landauer of IBM has pointed out that the process of calculation itself soon reaches fundamental limits. If the whole visible universe were one gigantic computer, made of components at the theoretical lower limit of size and energy consumption, it would still be insufficient for some problems that are soluble "in principle."

Far short of the complexity represented by a human being, some mere machines called computers nevertheless have already reached the point where their actual behavior is predictable only to a rough approximation, and we must be careful to program internal checks to detect when these highly individualized robots deviate from their intended instructions.